

INPUT DEVICE FOR ANALOGOUSLY MULTIDIMENSIONAL
CONTROLLING COMPUTER

Field of Invention

This invention relates to an input device for analogously multidimensional controlling computer, particularly to one having a coordinate controlling game pad having a dome-shaped bottom and a touch pad to provide the feature of second two-dimensional coordinate controlling to be implemented in a mouse for controlling a computer in multi-dimensions.

The conventional mouse is moveable in x-axis and y-axis so as to control the computer. Therefore, in the actual practice, the movement of the lateral scroll bar and the vertical scroll bar, and redundant steps are required in order to control operation. Particularly, while viewing or editing a lengthy document, such operation is apparently inconvenient and results in various limitations, while reducing the editing efficiency.

In view of the above shortcomings, this invention provides a reasonable design to effectively overcome the above defects. This invention provides a second 2-dimension linear coordinate input device so as to retain the function of 2-dimension and to control the operation of the computer in multi-dimensions, such as the movement of the lateral scroll bar and the vertical scroll bar.

It is an objective of this invention to provide an input device for analogously multidimensional controlling computer, where a coordinate controlling game pad with a dome-shaped bottom is provided in a mouse and a resistive or inductive type touch pad, for controlling operation of the computer in multi-dimensions in cooperation with execution of a program as well as a mechanical or optical mouse structure, facilitating the operator to quickly and agilely move to any location of the document.

In application of this invention, an electrical two-dimensional coordinates and an input device for multidimensional controlling computer is provided, where its design may be implemented in 3-dimentional drafting, reading a document, browsing a web page, and *etc.*, so as to significantly improve operator's operation efficiency.

In additional to providing an electrical two-dimensional coordinates and an input device for multidimensional controlling computer, this invention allows expansion and applications that is more diversified as compared to the conventional 2-dimensional coordinate control.

The foregoing aspects and many of the attendant advantages of the present invention will become more readily appreciated as the same becomes better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings.

Brief Description of Drawings

Fig. 1 is an exploded view of the structure of this invention;

Fig. 2 is a schematic view showing the touch pad of this invention is pressed by the dome-shaped object of the coordinate controlling game pad;

Fig. 3 illustrates a circuit diagram of this invention;

Fig. 4 is a flowchart of this invention; and

Fig. 5 is a schematic view illustrating the x- and y-coordinates of the second two-dimensional input device versus their corresponding voltage values.

List of Reference Numerals

1.	mouse	19	right button switch
11	bracket	12	cover
12	track ball	21	left button
13	circuit board	22	middle button
14	x-axis optical wheel	23	right button
15	y-axis optical wheel	24	microprocessor
16	receiving unit	25	support member
17	transmitting unit		
18	left button switch		
2	coordinate controlling game pad/button		
3	dome-shaped object		

With reference to Fig. 1, this invention relates to "an input device for analogously multidimensional controlling computer," including: a mouse 1, a coordinate controlling game pad/button 2, and a touch pad 4.

With reference to Figs. 1 to 3, the mouse (which is illustrated in this embodiment to be an optical encoding mouse) 1, including a bracket 11, a track ball 12, a circuit board 13, an x-axis optical wheel, a y-axis optical wheel, a receiving unit 16, a transmitting unit, a left button switch 18, a right button switch 19, a cover, a left button 21, a middle button 22, a right button 23, and a microprocessor 24 having an analog-to-digital converter therein. The connection relationship among such components, which are not the features of the invention, is not described herein. In this arrangement, a set of corresponding support member 25 is provided on the circuit board 13 at location between the neighborhood of the left switch button 18 and the right switch button 19.

The touch pad 4 is mounted in the support member 25 of the bracket 11 and is connected to the microprocessor 24 on the circuit board 13, wherein the touch pad 4 is a resistive member, which produces different resistance and produces different analog voltage values by the operation of the circuit according to the position resulted upon application of external forces. In the meantime, the microprocessor 24 will transform the analog voltage values into **digital** signals, execute the program therein to obtain the position of the spatial coordinates, and achieve the multidimensional operation for controlling the second 2-dimensional multi-dimensions.

The coordinate controlling game pad/button 2 is of an arc shape. It is mounted over the touch pad 4 and corresponds to the middle button 22 of the cover 20. A dome-shaped object 3 is set under the coordinate controlling game pad/button 2. The button of the dome-shaped object 3 is coupled to the central position (0, 0) of the touch pad 4. Therefore, the dome-shaped object 3 is caused to contact the game pad/button 2 to control the direction when the operator presses the button.

When the touch pad 4 is pressed by the dome-shaped object 3 of the coordinate controlling game pad/button, its x- and y-axes resistive members would generate two sets of resistance values, wherein one is the x-axis resistance value and the other the y-axis resistance value, which are then transferred into corresponding voltage values by means of the circuit to be input into the microprocessor 24. Different position to be pressed will result in different coordinate voltage values, and the microprocessor 24 will transform these two coordinate values into digital signals to obtain the position of the spatial coordinates upon executing the program within the microprocessor 24. According to the design of this invention, if the voltage values vary within the

range of 3~5 V, the corresponding coordinate values converted from the voltage input are as shown in Fig. 5, wherein

Upon pressing position A, the voltage value is 4.5V in x-axis and 4.5V in y-axis, wherein the position A has a coordinate of (2,2)..

Upon pressing position B, the voltage value is 3.75 V in x-axis and 3.5 V in y-axis, wherein the position B has a coordinate of (-1, -2).

The above describes the hardware configuration of the input device for analogously multidimensional controlling computer of this invention. Accordingly, by means of the structure as disclosed, the operation of the circuit, and the execution of the program, the operator is able to move the mouse to control the computer in multiple directions, facilitating the operator to quickly and agilely move to any location of the document thereby improving operation efficiency.

With reference Fig. 4 which illustrates a flowchart of this invention, wherein a buffer I stores the second 2-dimensional coordinate registers (in x- and y-axes), wherein:

a buffer II stores the left, middle and right button input registers;

a buffer III stores the x-axis input register of the mouse;

a buffer IV stores the y-axis input register of the mouse; and

after processing, the registers are delivered to the computer for controlling movement of the mouse.

First, the registers and memory of the microprocessor in the mouse are initialized in step 301.

The resolution and baud rate of the mouse is then initialized in step 302.

The communication protocols of the computer are then initialized in step 303.

The code as scanned is then delivered and the analog voltage values of the coordinates are then retrieved in step 311.

The analog voltage values of the coordinates are then transformed into values of digital coordinates to be stored into the buffer I in step 312.

The left, middle and right button input registers are then retrieved in step 321.

The left, middle and right button input registers are then stored into the buffer II in step 322.

The x-axis register of the mouse is then retrieved in step 331.

The x-axis register of the mouse is then store in to the buffer III 332.

The y-axis register of the mouse is then retrieved in step 341.

The y-axis register of the mouse is then store in to the buffer IV 342.

The data in the buffers I, II, III and IV are formatted to form data format in step 35.

The data format is then subject to inspection to confirm whether it is proper in step 36.

If the data format is proper, the data format is delivered to the computer for processing in step 37.

If the data format is improper, the data format is not delivered and the program is re-executed to ensure proper operation of the mouse.

In sum of the above, the "input device for analogously multidimensional controlling computer" of this invention allows expansion and applications that is more diversified as compared to the conventional 2-dimensional coordinate control, while preserving the conventional functions but also allowing control of input directions.

However as is understood by a person skilled in the art, the foregoing preferred embodiments of the present invention are illustrated of the present invention rather than limiting of the present invention. It is intended that various modifications and similar arrangements (such as a minute gap may be maintained between the dome-shaped object and the central portion of the touch pad) be included within the spirit and scope of the appended claims, the scope of which should be accorded the broadest interpretation so as to encompass all such modifications and similar structure.

What is claimed is:

1. A input device for analogously multidimensional controlling computer, providing more diversity as compared to the conventional 2-dimensional coordinate control, including:

a mouse, including a bracket and a cover, wherein the bracket is provided thereon with a track ball structure and a circuit control unit;

a touch pad of a sheet-like configuration provided over the bracket and connected to the circuit control unit, the touch pad being a resistive member that produces different analog voltage values according to the position resulted upon application of external forces, which analog voltage values are than be transformed into corresponding coordinate values by means of operation of the circuit, and in the meantime, the circuit control unit will transform the analog voltage values into **digital** signals, execute the program therein to obtain the position of the spatial coordinates, and achieve the multidimensional operation for controlling in multi-dimensions; and

a coordinate controlling game pad/button mounted over the touch pad and corresponds to a middle button of the cover, a dome-shaped object being set under the coordinate controlling game pad/button, the button of the dome-shaped object being coupled to a central position of the touch pad, such that the dome-shaped object is caused to contact the game pad/button when an operator presses the button.

2. The input device for analogously multidimensional controlling computer of Claim 1, wherein the dome-shaped object is selected from a rubber sheet, plastic sheet or an object of similar effects.
3. The input device for analogously multidimensional controlling computer of Claim 1, wherein a minute gap may be maintained between the dome-shaped object and a central portion of the touch pad
4. The input device for analogously multidimensional controlling computer of Claim 1, wherein the bracket is provided thereon with a set of corresponding support member on which the touch pad is mounted.

Abstract

This invention relates to an input device for analogously multidimensional controlling computer, for providing an input device with improved variations as compared to a two-dimensional coordinate control, including: a mouse, a coordinate controlling game pad having a dome-shaped bottom and a touch pad. In essence, a touch pad is provided to a bracket of the mouse at a location corresponding to a middle button provided to the cover. The touch pad is provided thereabove with slightly dome-shaped coordinate controlling game pad. The dome-shaped object of the coordinate controlling game pad is able to apply a force towards a central portion of the touch pad. The touch pad would produce different analog voltage values according to the position resulted upon application of external forces, which analog voltage values are then be transformed into corresponding coordinate values by means of a circuit and execution of a program, so as to operate the computer in multi-dimensions (such as reading a document or browsing a web page, *ect.*) in cooperation with a mechanical or an optical mouse structure, facilitating the operator to quickly and agilely move to any location of the document in an easy manner thereby improving operation efficiency.

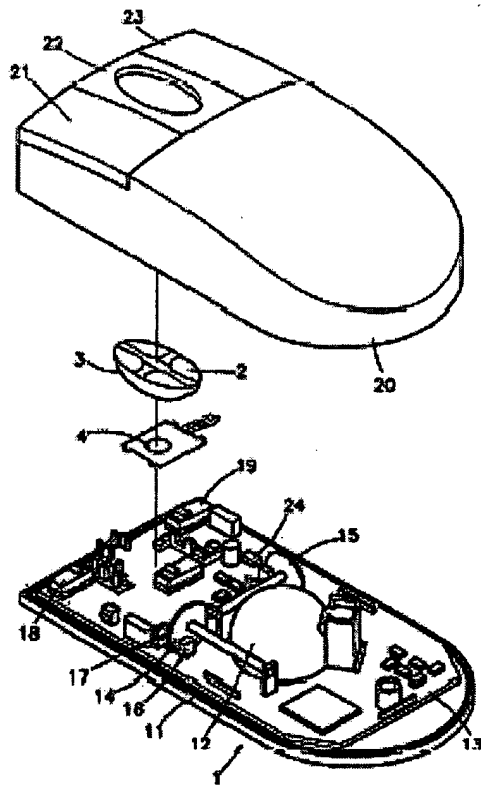


Fig. 1

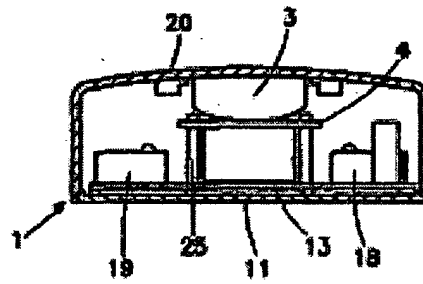


Fig. 2

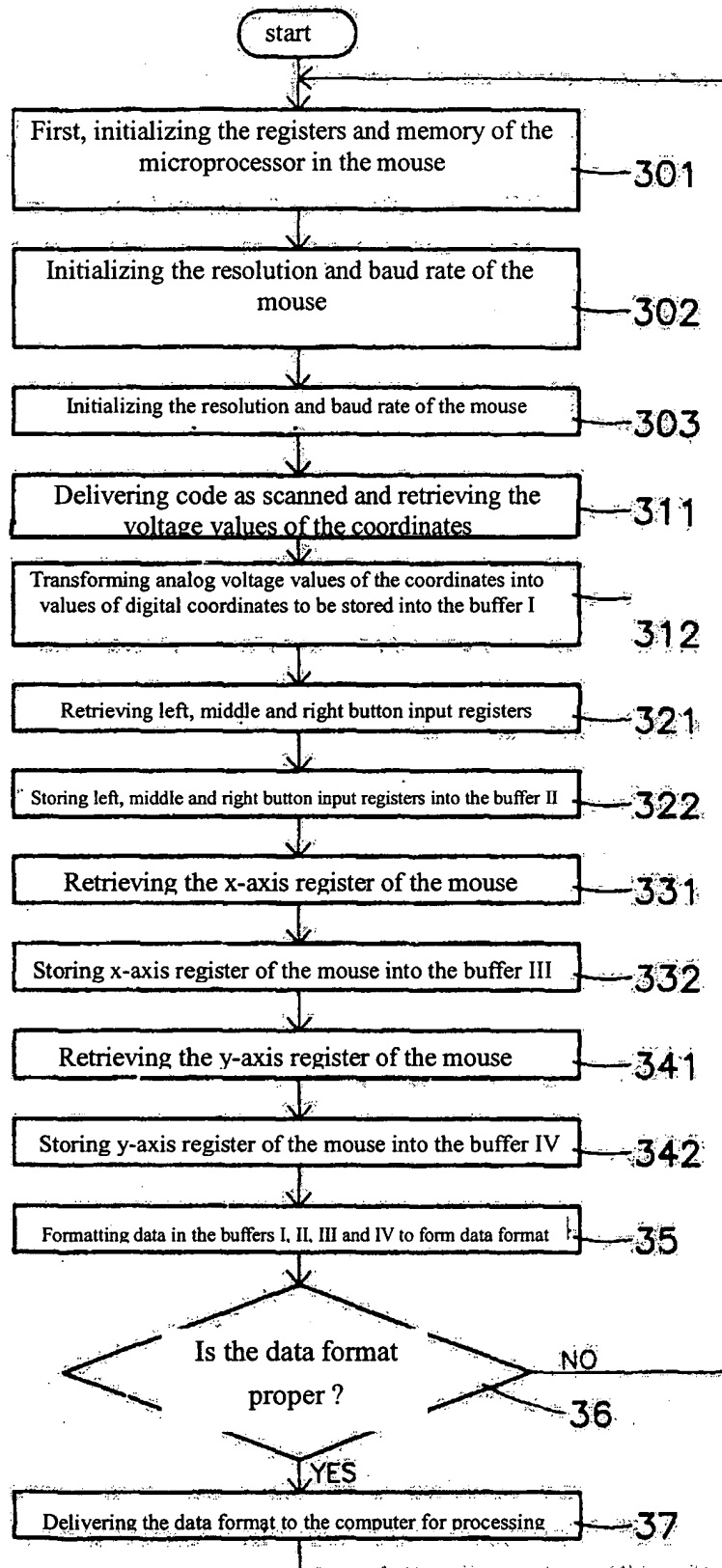


Fig. 4

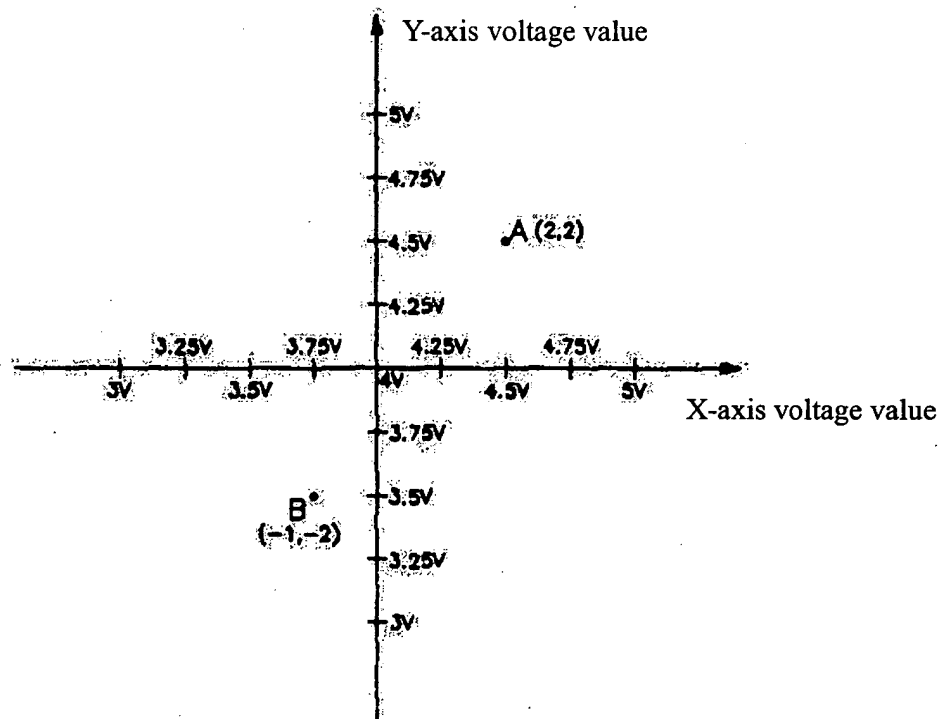
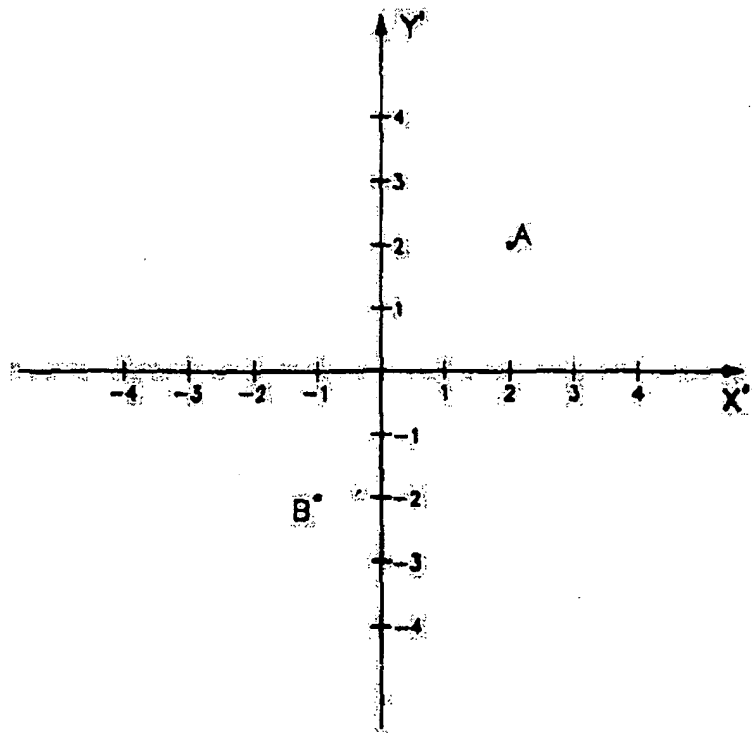


Fig. 5

公告本

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修正 補充			發明 新 型			專 利 說 明 書		
67日								
一、發明 新 型	中 文	類比式多方向控制電腦輸入裝置						
	英 文							
二、發明 創 作 人	姓 名	鄭國書						
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	代 表 人 姓 名							

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四、中文創作摘要（創作之名稱：

類比式多方向控制電腦輸入裝置

本創作係一種類比式多方向控制電腦輸入裝置，提供一較二維座標控制更具變化之輸入裝置，包括一滑鼠、一其底部具有圓弧狀之座標控制墊（Game Pad）及一感觸墊（Touch Pad）等元件，其主要是於滑鼠之底座內，對應於上蓋中間按鍵之位置上，設有一感觸墊，感觸墊之上方則有一略呈圓弧形之座標控制墊，該座標控制墊之圓弧狀物件可施壓於感觸墊之中心部位，該感觸墊可依受壓施力部位之不同，形成不同類比電壓變化，並藉由電路及程式執行，轉換成相對的座標值，且結合機械式或光學式之滑鼠結構，以多方向控制電腦之運作（如閱讀一般文件或網路的首頁．．．等），以利操作者可更加快速且靈活的地移動至文件的任一點位置，方便操作者來使用，進而提升工作效率。

英文創作摘要（創作之名稱：

五、創作說明 (/)

本創作係一種類比式多方向控制電腦輸入裝置，尤指一種可藉一其上具有圓弧狀物件之座標控制墊及一感觸墊來增加上第二個二維座標控制的功能，以應用於滑鼠上，作為電腦的多方向控制輸入。

按，傳統之滑鼠係以 X、Y 軸兩方向來移動其鼠標，進而控制電腦的動作，於實際電腦應用時，如文書頁之橫捲軸及縱捲軸的移動，需利用多個步驟，才能控制運作，尤其在長篇文章的觀看編輯時，實在是不大方便，且有諸多之限制，操作編輯之效率，亦無法提高。

於是，本創作人有感上述缺失之可改善，乃特潛心研究並配合學理之運用，終於提出一種設計合理且有效改善上述缺失之本創作，以提供一種可作第二個二維線性座標滑鼠輸入之裝置，俾其除了保有 2 維座標功能外，並可多方向控制電腦之運作，如前述文書頁之橫捲軸及縱捲軸之移動．．．等應用。

本創作之一目的，係提供一種類比二維座標且含多方向控制電腦輸入裝置，其係於滑鼠內裝設一其底部具有圓弧狀物件之座標控制墊及一可為電阻式或電感式之感觸墊等組成單元，使其可配合程式執行及結合機械式或光學式之滑鼠結構，以多方向控制電腦之運作，以利操作者可更加快速地且靈活的移動至文件的任一點位置。

本創作在應用上，乃提供一個電子式二維座標且含多方向控制電腦輸入裝置，藉其設計，可應用於 3 D 繪

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五、創作說明(>)

圖、閱讀文件、網路首頁 等，俾能大大提升使用者之工作效率。

本創作除了提供一個電子式二維座標且含多方向控制電腦輸入裝置外，藉其設計，使其提供較一般二維座標控制更具變化之擴充與應用。

為達成上述目的與結構，本創作採用下列技術方式並達其功效，茲繪圖就新型之實施例詳加說明其結構及功能如下，俾完全瞭解。

第一圖為本創作結構之分解圖。

第二圖為本創作之感觸墊受座標控制墊之圓弧狀物件抵壓之示意圖。

第三圖為本創作之電路圖。

第四圖為本創作之流程圖。

第五圖為第二個二維輸入裝置 X、Y 座標與相對應之電壓值之示意圖。

圖號及其電路單元名稱之說明：

1	滑鼠	19	右鍵開關
11	底座	20	上蓋
12	軌跡球	21	按壓左鍵
13	電路板	22	按壓中鍵
14	X 軸光圈輪	23	按壓右鍵
15	Y 軸光圈輪	24	微處理器
16	接收元件	25	支持件
17	發射元件		

五、創作說明 (→)

- 18 左鍵開關
- 2 座標控制(鈕)墊
- 3 圓弧狀物件
- 4 感觸墊

請參閱第一圖所示，本創作係一種「類比式多方向控制電腦輸入裝置」，包括一滑鼠(Mouse)1、一座標控制(鈕)墊 (Game Pad)2及感觸墊(Touch Pad)4等構件組成單元；其中：

請參閱第一至第三圖所示，滑鼠(其在本創作之實施例中是採光學式之編碼方式)1，包括有一底座11、一軌跡球12、一電路板13、一X軸光圈輪14、一Y軸光圈輪15、接收元件16、發射元件17、一左鍵開關18、一右鍵開關19、一上蓋20、一按壓左鍵21、一按壓中鍵22、一按壓右鍵23、一其內含有類比數位轉換器之微處理器24、．．．．．等組成單元，由於其單元間之連結關係並非本創作撰述之重點，故，於此不再進一步贅述)，其中在電路板13上鄰近左鍵開關18、右鍵開關19之間設有一組相對應之支持件25。

感觸墊 4，接設於底座11之支持件25上，且與電路板13上之微處理器24連接，令感觸墊4為電阻性元件；當其受外力抵壓時，可依施力之位置不同，形成不同電阻值，並經電路之動作形成不同類比電壓值，此時，該微處理器24會將該類比電壓值轉換成數位信號，並依其內部程式執行，而得知空間座標點之位置，進而完成第二

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五、創作說明 (4)

個二維多方向的控制座標。

座標控制(鈕)墊 2，略呈圓弧形，位於感觸墊 4 上方，且相對應於上蓋 20 之按壓中鍵 22，該座標控制(鈕)墊 2 之下方具設有一圓弧狀物件 3，該圓弧狀物件 3 之底部係與感觸墊 4 中心位置點 (0.0) 相接，以利操作者按壓時，恰可使圓弧狀物件 3 觸接於感觸墊 2 來控制輸入方向。

當感觸墊 4 受到座標控制(鈕)墊 2 之圓弧狀物件 3 抵壓時，其 X、Y 方向之電阻性元件，會產生二組電阻值，其中一為 X 方向電阻值，一為 Y 方向之電阻值，而經電路中會轉換為相對電壓值，並輸入微處理器 24，且因抵壓位置不同，會產生不同的座標電壓值，該微處理器 24 會將這二個座標值轉換成數位信號，並依微處理器 24 內部程式執行，而得知空間座標點之位置，在本創作之設計上，若令其電壓變動之範圍為 3 ~ 5 V，可利用此電壓輸入轉換成相對座標值，如第五圖所示；

按壓至 A 點時，在 X 方向電壓值為 4.5 V；Y 方向電壓值為 4.5 V；A 點的座標為 (2, 2)。

按壓至 B 點時，在 X 方向電壓值為 3.75 V；Y 方向電壓值為 3.5 V；B 點的座標為 (-1, -2)。

以上即本類比式多方向控制電腦輸入裝置的硬體架構，如此，即可透過該結構、電路動作及程式之執行，以令操作者可多方向移動滑鼠控制電腦之運作，更加快

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五、創作說明 (5)

速且靈活的移動至文件的任一點位置，進而提升操作者之工作效率：

請參閱第四圖所示，係本創作程式執行之流程圖，其中緩衝器 I 存放第二個二維座標值暫存器（包含 X 方向及 Y 方向）；

緩衝器 II 存放左、中、右鍵輸入暫存器；

緩衝器 III 存放滑鼠 X 軸輸入暫存器；

緩衝器 IV 存放滑鼠 Y 軸輸入暫存器；

並經處理後，送至電腦來控制滑鼠之動作。

首先，初始化 (Initial) 滑鼠內微處理器之暫存器 (Register) 與記憶體 (Memory) 301；

初始化 (Initial) 滑鼠之解析度及傳輸速度 (Baud Rate) 302；

初始化 (Initial) 電腦的通訊協定 303；

送掃描碼並讀取座標的類比電壓值 311；

將座標的類比電壓值轉換成數位座標之數值存入緩衝器 I 312；

讀取左、中、右三鍵輸入暫存器 321；

將左、中、右三鍵輸入暫存器存入緩衝器 II 322；

讀取滑鼠 X 座標暫存器 331；

將滑鼠 X 座標暫存器存入緩衝器 III 332；

讀取滑鼠 Y 座標暫存器 341；

將滑鼠 Y 座標暫存器存入緩衝器 IV 342；

將緩衝器 I、II、III、IV 資料格式化為輸出格式資

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五、創作說明 (6)

料 35：

檢查資料輸出格式(Data Format)是否正確？36

若資料輸出格式正確，則輸出資料送至電腦來處理

37：

若資料輸出格式錯誤，則不送出資料，並重新執行程式，使滑鼠正常動作。

綜上所述，本創作「類比式多方向控制電腦輸入裝置」係提供一較二維座標控制更具變化之應用之輸入裝置，乃一不可多得新型專利者，不僅可保有原功能外，且可控制輸入時之方向性，完全符合專利申請要件，故爰依專利法提出申請之，請詳查並賜准本案，以保障創作者之權益，若 鈞局貴審查委員有任何稽疑，請不吝來函指示。

惟，以上所述僅為本創作之較佳可行實施例，非因此即拘限本創作之專利範圍，故舉凡運用本創作說明書及圖式內容所為之等效結構變化(如圓弧狀物件亦可與感觸墊中心部位保持些微間距)，均同理皆包含於本創作之範圍內，合予陳明。

(請先閱讀背面之注意事項再填寫本頁)

訂

年 月 日 修正

87.12.23 補充

六、申請專利範圍

1. 一種類比式多方向控制電腦輸入裝置，係提供一較二維座標控制更具變化之輸入裝置，包括：

一滑鼠，係由一底座及上蓋組成，其中底座上設有

87.12.23

一軌跡球結構及一電路控制單元；

一感觸墊，呈片狀，接設於底座上，且與電路控制單元連接，令感觸墊是一電阻性元件，當受其外力抵壓時，依抵壓的位置不同，形成不同的電阻值，並經電路的動作，形成不同類比電壓值，此時，該電路控制單元會將該類比電壓值轉換成數位信號，並依其內部程式執行，而得知空間座標點之位置，進而完成多方向的控制；及

一座標控制墊，位於感觸墊上方，且相對應於上蓋之按壓中鍵，該座標控制墊之下方具設有一圓弧狀物件，該圓弧狀物件之底部與感觸墊中心位置點搭接，以利操作者按壓時，恰可使圓弧狀物件觸接於感觸墊。

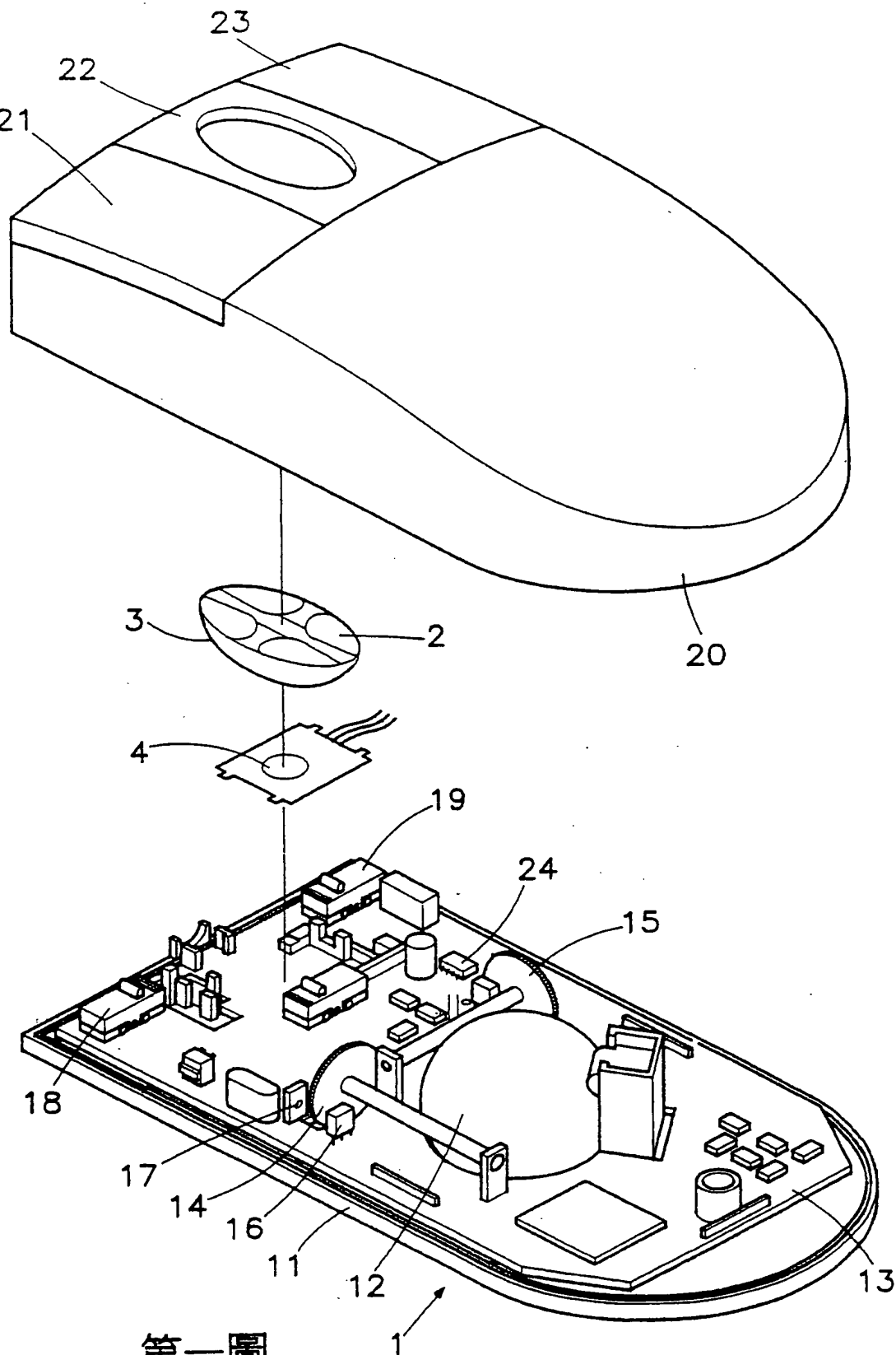
2. 如申請專利範圍第1項所述之類比式多方向控制電腦輸入裝置，其中圓弧狀物件可為一橡皮、膠皮或具相同功效之物件。

3. 如申請專利範圍第1項所述之類比式多方向控制電腦輸入裝置，其中圓弧狀物件亦可與感觸墊中心部位保持些微間距。

4. 如申請專利範圍第1項所述之類比式多方向控制電腦輸入裝置，其中於底座上可設有一組相對應之支持件，供感觸墊接設於其上。

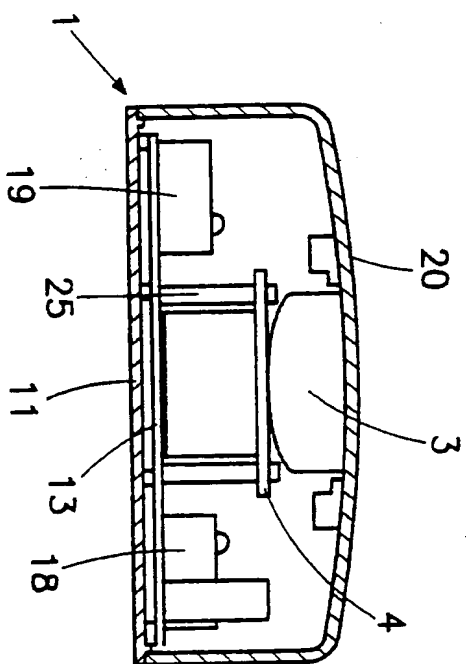
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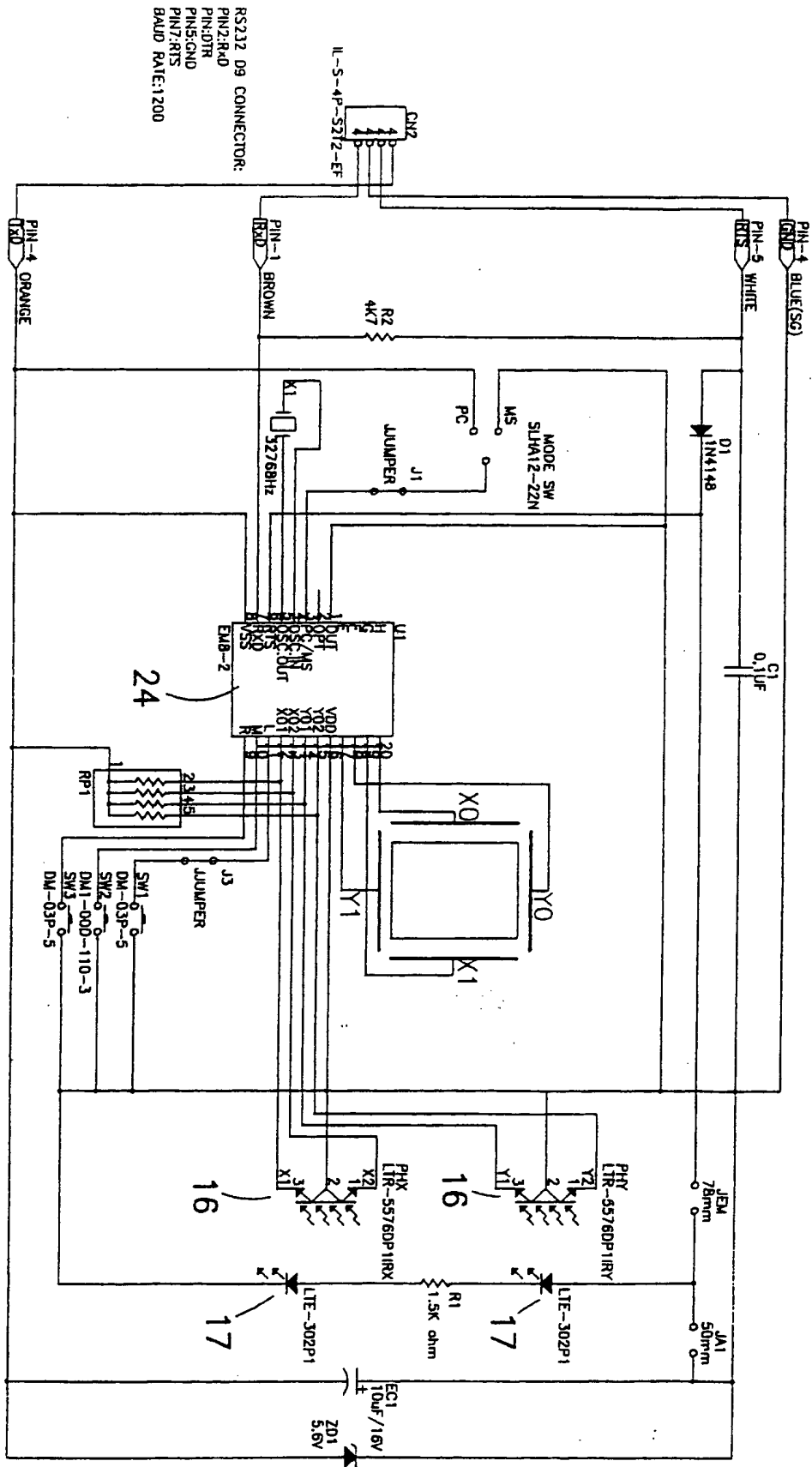
第一圖

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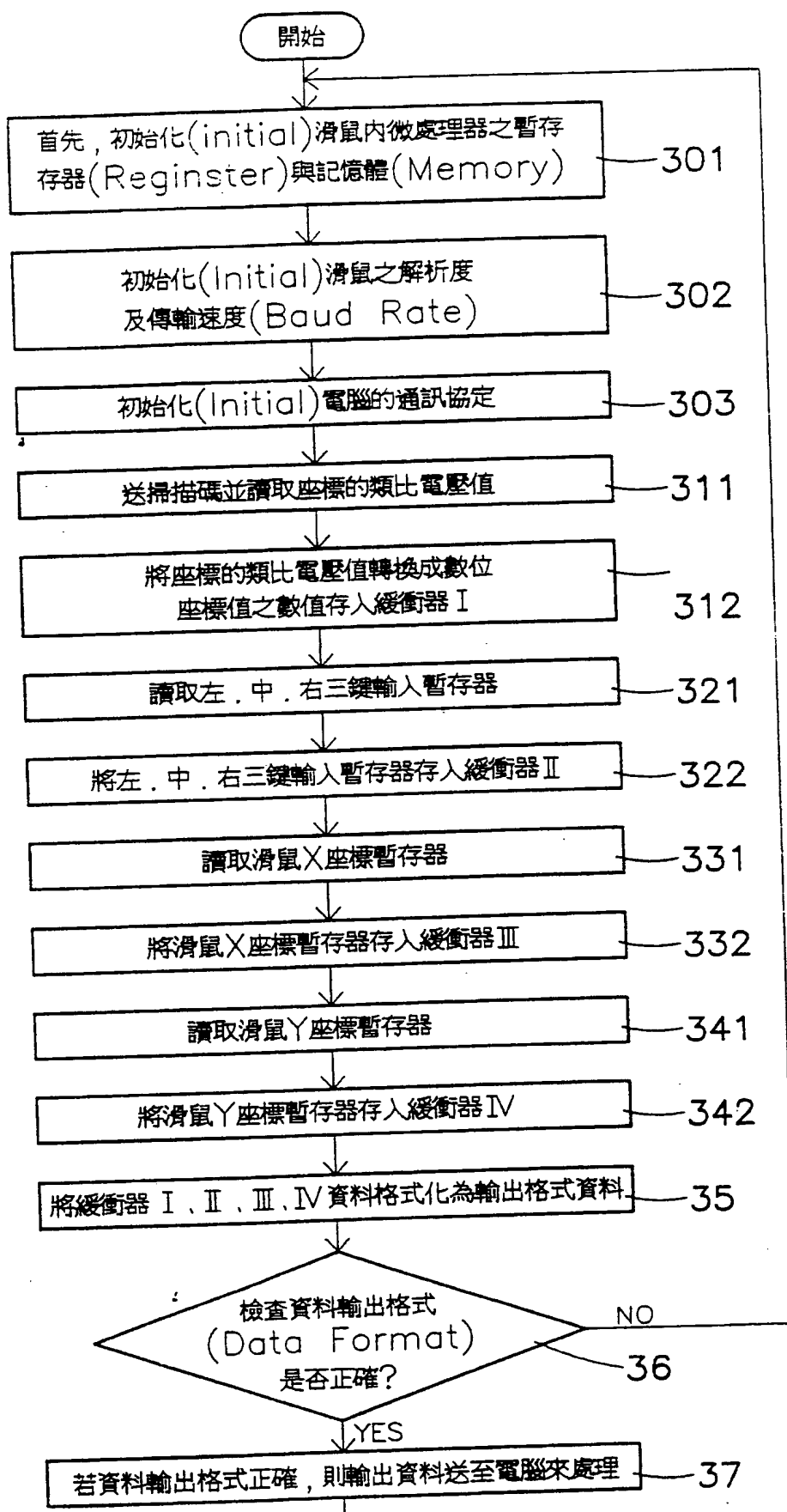
第二圖

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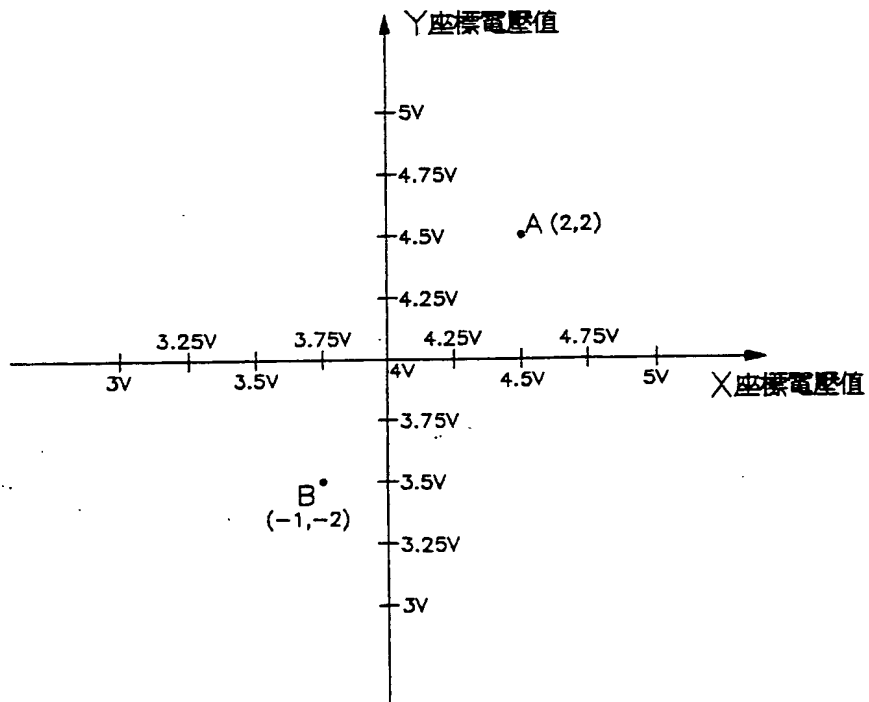
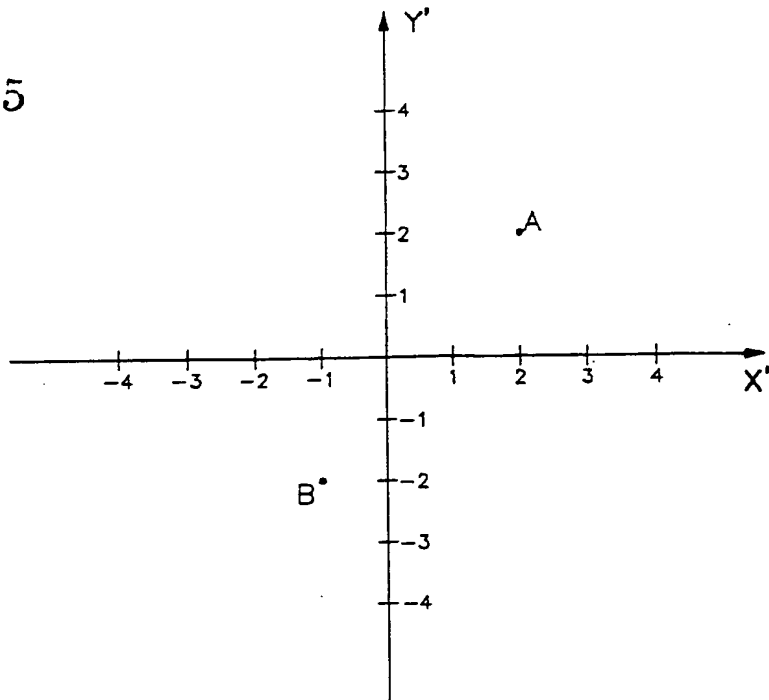
第三圖

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第四圖

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第五圖